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Employees' Pro-Environmental Behaviors: A Bibliometric Review and Future Research Agenda

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- Employees' Pro-Environmental Behavior's
- EPEB
- Review
- Sustainability

Abstract: Due to recent environmental challenges, employees' pro-environmental behaviors (EPEB) have received considerable attention in pursuit of sustainability. Despite empirical and review studies in this area, future researchers still have scope to explore new theories, contexts, characteristics, and methodologies. Additionally, only two review papers have been published in the Scopus database on this topic, and neither is a bibliometric analysis. To address this gap, this study systematically reviews the literature through a bibliometric analysis to identify publication patterns, the field's conceptual, intellectual, and social structure, and future research directions. *Methodology*. Using the Scopus database and the Boolean operator "OR", we searched for terms related to employees' pro-environmental behaviors in 2025. The database automatically identified 162 documents from 2013 to 2025; after applying inclusion and exclusion criteria, 137 documents remained for analysis. *Findings*. Thematic analysis indicates that EPEB is a less developed concept with medium centrality or importance and thus warrants further study. Additionally, publications are increasing gradually, with 27 articles in 2024. A prominent journal is Sustainability (Switzerland). The most prominent country related to corresponding authors and publications is China. *Conclusion*. This study contributes to the literature by addressing the scarcity of bibliometric reviews on EPEB. Through bibliometric analysis, this study reports what is known by conducting performance analysis and science mapping, and what is unknown by mapping the future research agenda. Lastly, the practical implications of EPEB on organizational sustainability strategies, green HRM, and managerial decision-making are explained.

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INTRODUCTION

Employees' pro-environmental behavior has attracted considerable research attention in recent years because it directly relates corporate and overall environmental sustainability (Farrukh et al., 2025; Kim et al., 2024; Ren et al., 2024; Yang & Li, 2023; Zhang et al., 2024). Specifically, employee pro-environmental behavior is any employee behavior within an

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organization that contributes to environmental sustainability (Din et al., 2025a; Zheng et al., 2025). Such behaviors include recycling, conserving energy, and supporting environmental initiatives (Lee et al., 2024). Employees' pro-environmental behaviors are not shaped in isolation; they are influenced by an organization's policies and leaders (Din et al., 2025b). Beyond environmental benefits, such behaviors enhance organizational reputation and attract environmentally conscious stakeholders (Alherimi et al., 2024; Usman et al., 2023).

To enhance understanding of drivers of EPEB, previous studies identified different individual-level antecedents and predictors (Ansari & Khan, 2024; Tu et al., 2023; Zhang & Sun, 2021), including personal norms, emotions, attitudes, values, guilt, identification, self-efficacy, environmental passion, intentions, motives, commitment and satisfaction, knowledge, and perceived behavioral control. At the organizational level, studies have widely investigated green human resource management (GHRM), green transformational leadership (GTL), corporate social responsibility, organizational green compensation (OGC), organizational management support, green organizational culture, and green management systems as predictors of EPEB (Alherimi et al., 2024; Kim et al., 2024; Ren et al., 2024; Shah et al., 2023; Song et al., 2024; Zhang & Sun, 2021). Recently, some studies have examined organizational- and individual-level factors related to EPEB (Mateen et al., 2023; Zhang & Sun, 2024a). A recent study by Yang et al. (2025) notes and confirms that previous studies have mainly focused on the antecedents and predictors of EPEB. In addition to empirical studies, two reviews have appeared in the literature. The first was conducted by Young et al. in 2015, and the second was conducted by Farooq & Yusliza in 2023. The first review included only 17 articles. The authors used traditional and narrative methods to analyze the data qualitatively. Similarly, the second review (Farooq & Yusliza, 2023) used a systematic literature review and included 106 articles. They also identified the themes, which are presented in narrative form.

The theories adopted in the study of the EPEB reflect diverse perspectives and span different subject areas. The commonly used theories originate in fields such as organizational behavior, human resource management, social psychology, motivational psychology, and environmental psychology. Those theories include the Social Exchange Theory (Blau, 1964; Cropanzano & Mitchell, 2005), Ability–Motivation–Opportunity Theory (AMO) (Appelbaum, 2000), Social Identity Theory (Tajfel, 1985), Theory of Planned Behaviour (Ajzen, 1991), Social Cognitive Theory (Bandura, 1988), Self-Determination Theory (Deci & Ryan, 2008) and Values–Beliefs–Norms Theory (Stern et al., 1999).

Various theoretical perspectives examine how different antecedents and predictors influence EPEB. For example, drawing on Social Exchange Theory, researchers examine why employees engage in EPEB as a reciprocal response to what they receive from the organization (Ansari & Khan, 2024; Kim et al., 2024; Shah et al., 2023). Other researchers using the Ability-Motivation-Opportunity theory (AMO) focus on organizational conditions that enable employees to behave in pro-environmental ways. Empirical studies have found that these organizational conditions, including GHRM practices and green organizational culture, increase employees' abilities and motivation and provide opportunities for pro-

environmental behavior (Chua et al., 2024; Zhang & Sun, 2024). Other theories focus on individual-level psychological and behavioral mechanisms to understand EPEB. Drawing on Social Identity Theory, researchers argued that employees' identification with the organization influences their motivation, involvement, and behaviors. For example, Leitao et al. (2024) and Min et al. (2024) argued that when employees identify with the organization, its goals, and values, they are more likely to behave in line with organizational policies and practices. Similarly, using the Theory of Planned Behavior, researchers find that employees' intention to engage in pro-environmental behaviors depends on their attitude, perceived behavioral control, and subjective norm (Ajzen, 1991). Studies using Social Cognitive Theory (Bandura, 1988) extend this view that EPEB results from the interaction between environmental influences and individual cognition. For example, Ali et al. (2023) and Mateen et al. (2023b) noted that employees' cognition continuously interacts with environmental influences, including CSR, GHRM practices, and green psychological climate, guiding their actions in line with organizations' environmental expectations. Researchers using Self-Determination Theory (Deci & Ryan, 2008) EPEB through a motivational lens. They explain how organizational factors may enhance employees' autonomous motivation (Dong et al., 2024; Faraz et al., 2021; Yuan & Li, 2023). Using Values–Beliefs–Norms Theory (Stern et al., 1999), studies have examined both individual-level factors (Haldorai et al., 2024; Lu et al., 2019; Zhang & Sun, 2024) and organizational-level factors (Afsar et al., 2018; Ture & Ganesh, 2018) to understand EPEB. Haldorai et al. (2024) argued that a causal chain links values, beliefs, and personal norms that guide employees' pro-environmental behaviors.

Although these theories provide insights into the factors that influence EPEB, their perspectives are complementary yet fragmented. This does not mean the theories contradict one another; instead, they explain EPEB from different angles and are rarely integrated or empirically tested within a broader theoretical framework. Consequently, research on EPEB has drawn on diverse theoretical perspectives, yet the literature's conceptual and intellectual structures have not yet been systematically mapped. Given this diversity, further empirical and review studies are required to integrate these theoretical perspectives and develop a holistic understanding of the factors influencing EPEB. Accordingly, this study conducts a bibliometric analysis to advance future research on EPEB by identifying publication patterns and mapping the field's conceptual, intellectual, and social structures. The analysis identifies dominant themes, theoretical associations, research fronts, and knowledge structures, providing a basis for identifying future research opportunities regarding theories, contexts, characteristics, and methodologies in studying EPEB.

Despite existing empirical and review papers, the literature still has limitations. Of the 137 papers published in the Scopus database on employees' pro-environmental behaviors, only two are review papers, and, to the best of our knowledge, none employ a bibliometric analysis. Consequently, the publication patterns and trends, conceptual, intellectual, and social structures, and thematic development of the EPEB research are not systematically mapped. This constitutes the first gap. Moreover, to underscore the second gap, recent

studies report that further research is needed in this area (Yang et al., 2023), and existing reviews focus on EPEB themes and predictors rather than providing evidence on the field's development and knowledge structure. Furthermore, the thematic map generated by this study shows that employees' pro-environmental behavior is positioned within Basic themes and Emerging or Declining themes. It indicates that it is a less-developed concept with medium relevance and warrants further study.

This review makes several theoretical, methodological, and practical contributions to the literature on EPEB. First, it contributes methodologically by conducting a bibliometric analysis to address the scarcity of such analyses and enrich the literature. Second, it identifies publication patterns and trends, providing an overview of the field's growth and development. Third, it identifies the field's conceptual, intellectual, and social structures to reveal the relationships among concepts, themes, and research communities. Fourth, this study identifies the theories currently used to study EPEB and suggests potential theoretical perspectives to advance its development. Fifth, it guides future researchers on the contexts, characteristics, and methodologies for studying this topic. Finally, this review discusses the practical implications and knowledge generated by this study, which may assist managers with sustainability practices within organizations.

Specifically, we introduced the first and second research questions outlined below to address the scarcity of bibliometric reviews in the literature. Unlike previous reviews that synthesized the literature using narrative and systematic approaches, this study uses bibliometric techniques to quantitatively analyze the field's development and structure. The first and second research questions align with the second gap and will address it by identifying publication patterns and trends and structuring the field's development. Finally, the third research question addresses the third research gap by mapping future research directions in this relatively underdeveloped research field. In particular, this study identifies what is already known and maps future research possibilities through theoretical perspectives, new contexts, characteristics, and methodologies that may help advance the EPEB literature.

The main goal of this study is:

1. To identify the publication patterns and trends on employees' pro-environmental behavior.
2. To analyze the conceptual, intellectual, and social structure of scientific production on EPEB.
3. To map the future research directions and opportunities on EPEB.

RESEARCH METHOD

Bibliometric analysis is a useful, quantitative approach with largely automated procedures that reduce, but do not eliminate, authorial subjectivity. This method synthesizes the publication metadata to identify patterns and trends in a specific, relevant topic. It provides an overview of the field's development and helps researchers understand its evolution over time (Tran et al., 2024). The Scopus database is used in this study for the following reasons:

first, it covers multiple disciplines, is focused, and is more representative of emerging fields than the Web of Science database (Sundarasen et al., 2024). Second, this database has more documents than Web of Science (Tran et al., 2024). Third, Scopus includes around 25,100 journals, compared to 21,419 in Web of Science (Paulsy & M, 2024).

Nevertheless, relying on a single database has limitations. First, despite its comprehensiveness, it may overlook publications in journals indexed in other databases, including Web of Science, Dimensions, or PubMed. Second, the findings may be subject to database selection bias, and interpretations should be approached with caution. In this regard, future researchers in bibliometric analysis are encouraged to use multiple databases to conduct a comprehensive review. Additionally, for a comprehensive review, future researchers are encouraged to conduct Hybrid reviews that complement bibliometric analyses with systematic/content reviews or meta-analyses.

Research Design

In addition to performance analysis, this study followed the methodology proposed by Palácios et al. (2021). The conceptual structure is examined by identifying the keyword co-occurrence network, the thematic map, the intellectual structure through co-citations and historiography, and the social structure by examining interactions among authors and countries. The database exported bibliographic records in CSV and BibTeX formats, which were then uploaded, processed, and analyzed using Microsoft Excel, RStudio version 4.4.1 for Windows, and Biblioshiny.

To ensure methodological integrity and replicability in identifying and selecting publications, this study followed the PRISMA guidelines (Lame, 2019). Article selection involves four stages: identification, screening, eligibility assessment, and inclusion. After selection, the metadata were analyzed using RStudio and Biblioshiny. The findings were then interpreted and discussed in relation to the research questions and the EPEB literature.

Search Strategy

The identification, screening, and inclusion of articles are summarized in Figure 1. The literature search was conducted in the database using Mahatma Gandhi University's institutional network on 7 January 2025 at 14:13. The search was performed in the Title, Abstract, and Keywords fields using the OR operator to combine alternative terms and variants referring to employees' pro-environmental behaviors (EPEB). The final search query was:

TITLE-ABS-KEY ("Employees' Pro-environmental Behaviors" OR "Employees' Pro-environmental Behaviors" OR "Employees' Pro-environmental Behavior" OR "Pro-environmental Behaviors at Workplace")

Through this search, 162 documents were retrieved. Following the inclusion and exclusion criteria mentioned below, 137 documents remained, from which 135 articles and two review articles were used for further bibliometric analysis. The study selection process involved

database filtering and applying predefined inclusion and exclusion criteria. The filtering options available in Scopus were used to refine the retrieved documents.

Study Selection through Inclusion and Exclusion Criteria

A total of six inclusion criteria were applied through database filtering and manual screening.

First, the results were filtered by Subject Areas. The included areas are Business, Management and Accounting; Environmental Science; Social Science; Economics, Econometrics, and Finance; Energy; Psychology; Art and Humanities; Multidisciplinary; Earth and Planetary Sciences; and Decision Sciences. The remaining 156 documents were reviewed; six were excluded because they related to the natural sciences.

The second criterion was based on Document Types. We included only articles and reviews, as they are scientific studies with proper methodology and are regarded as "certified knowledge" (Paulsy & M, 2024). In this phase, 19 papers were excluded as they were book chapters, conference papers, or editorial notes. 137 papers remained, comprising 135 articles and 2 reviews.

The third criterion was to include only the English articles. Since all the documents were in English, no filtration was necessary.

The fourth criterion was to include all articles published in this database, regardless of publication year. Accordingly, the database automatically selected articles published from 2013 to 2025.

The fifth criterion was that the searched terms (earlier mentioned) be used at least once in the (Article Title, Abstract, or Keywords) of the documents. We manually evaluated all 137 documents, and they satisfied this criterion.

The sixth criterion assessed whether the retrieved publications were relevant to the research scope of employees' pro-environmental behavior. We downloaded the papers and archived them in Mendeley Reference Manager. After manual review, it was found that all the documents fell within the research scope and were retained for bibliometric analysis.

Data Extraction

We extracted data from the database in CSV format and imported them into RStudio via the Biblioshiny interface. The imported data were then analyzed using the bibliometrix package in R to conduct performance analysis and science mapping.

Quality Assessment

The quality and relevance of the documents were ensured through predefined inclusion and exclusion criteria. Only research and review articles published in peer-reviewed journals were included. Book chapters, conference papers and presentations, editorial notes, and any other non-peer-reviewed documents are excluded (Paulsy & M 2024). Additionally, two authors manually screened the articles to assess whether they explicitly addressed EPEB. Also, the CSV file exported from the database is checked by the authors to ensure that the document's

details are not missing, including the authors' names, Journal, affiliation, country, keywords, DOI, etc., and are fully included. Lastly, as mentioned earlier, Sundarasen et al. (2024) support the database's quality and its coverage of peer-reviewed journals, reporting that the database indexes journals subject to peer-review policies.

Data Analysis

For bibliometric indicators, we used performance analysis to examine annual scientific production, mean total citations per year, three-field plots, the most relevant sources, sources' local impact, sources' production over time, most relevant authors, and other performance indicators. In addition, science mapping analyses were conducted to examine the field's conceptual, intellectual, and social structure. The conceptual structure was analyzed using the thematic map and the keywords' co-occurrence network; the intellectual structure was examined through the co-citation network and historiography; and the social structure was analyzed through authors' and countries' collaboration networks. Default bibliometric analysis parameters were applied unless otherwise stated. We modified only three field plots and the author collaboration network. We used Excel and Mendeley Reference Manager for data management, and RStudio version 4.4.1, the bibliometrix R package, and the Biblioshiny interface for analysis and visualization.

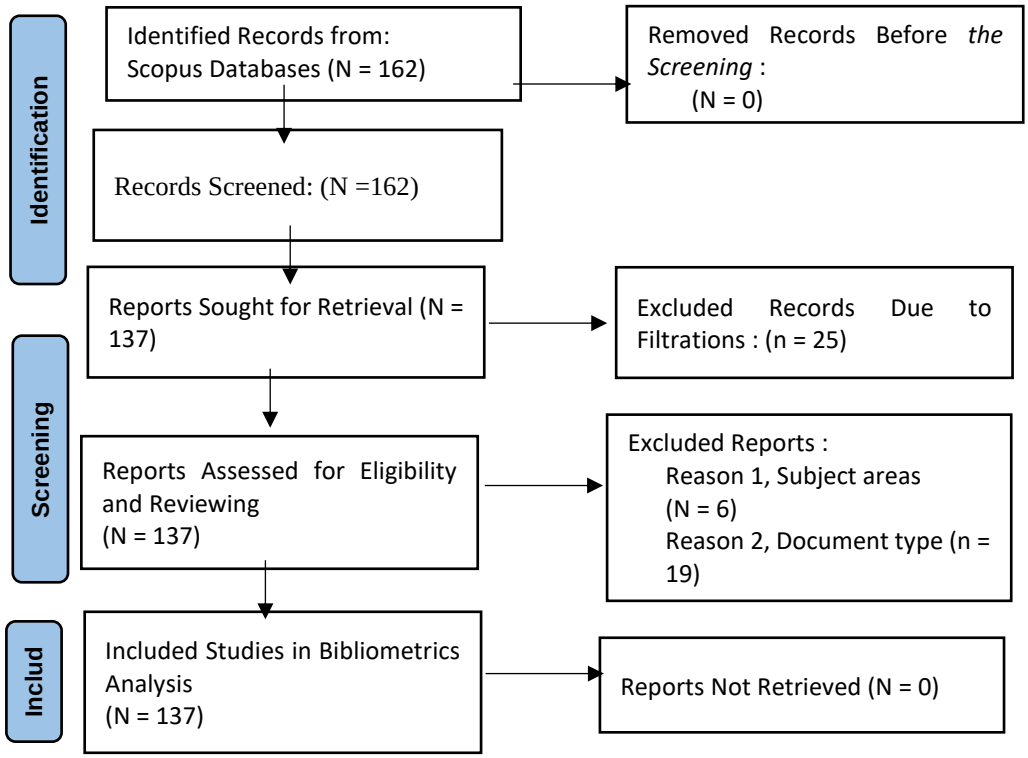


Figure 1. *PRISMA*

FINDINGS

The findings section is categorized into two main categories to answer the first and second research questions. The first category of findings concerns performance analysis, which addresses the first research question by identifying the publication performance and development of EPEB research. The second category of findings concerns science mapping and answers the second research question. Science mapping comprises the conceptual, intellectual, and social structures of EPEB research. The third research question is addressed in the Discussion section based on the findings.

Performance Analysis

Annual Scientific Production

According to the Scopus database, scientific production and academic attention on the topic began in 2013; that year, only one paper was published. Over the years, researchers' interest remained limited: in 2014, no publications appeared, and in 2015, only 2 did. These few publications suggest that this topic was not considered a broad domain, despite its presence in broader sustainability and environmental management research. From 2016 onward, publications in this domain increased gradually, and by 2024, 27 articles examined employees' pro-environmental behaviors. This sustained growth and sharp increase in recent years indicate that EPEB is a recognized research area. Also, this increase in publications is likely due to increasing business and political attention toward sustainability issues (Zheng et al., 2025), countries' efforts to achieve the United Nations Sustainable Development Goals (SDGs) (Din et al., 2025a), or organizations' efforts to understand how the adoption of environmental, social, and governance (ESG) practices enhances their positive outcomes (Zheng et al., 2025).

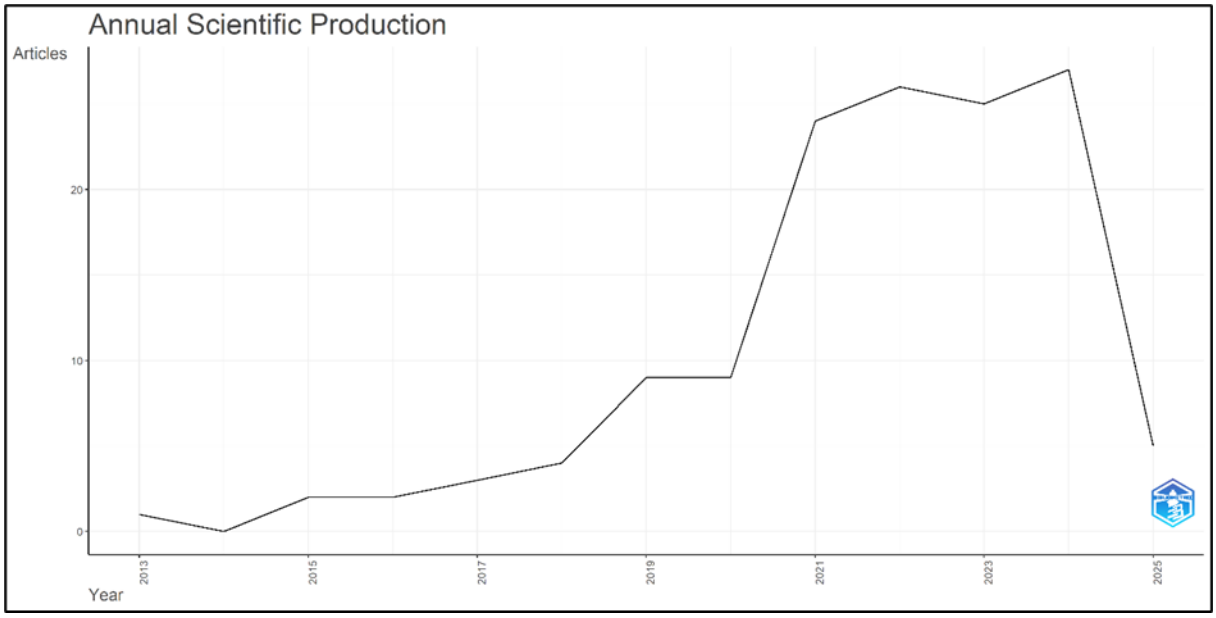


Figure 2. Annual Scientific Production

Note: Created by the authors using Biblioshiny, RStudio

Mean Total Citations per Year

The paper, published in 2013 (Robertson & Barling, 2013), had the highest citation impact, with a mean total citations per article of 711 and a mean total citations per year of 54.69. 2016 had the highest total citations, with a mean of 244 citations per article and 24.4 citations per year. The high citation counts in these two years suggest they are foundational contributions that enabled rapid subsequent research on EPEB.

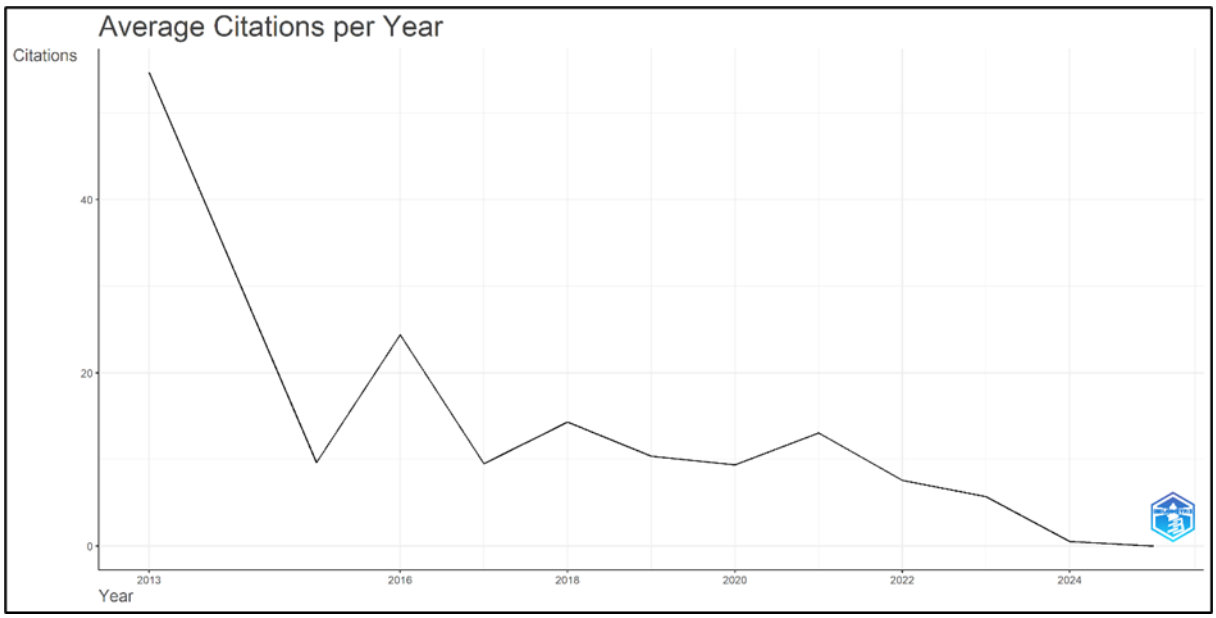


***Figure 3**. Average Citations per Year*

Note: Authors' creation using Biblioshiny, RStudio

Three field plots

A slight change is applied in the bibliometric analysis parameters of this subsection. This analysis illustrates the relationship between the author's name, country, and keywords. According to the study questions, the aim is to identify the intellectual orientation of research on EPEB. Prominent contributing authors include Ahmad N., Mahmood A., Afsar B., Han H., Scholz M., Sial MS., Ali M., Samad S., and Chan H. They are affiliated with Pakistan, China, Malaysia, Korea, Australia, the United Kingdom, Saudi Arabia, the USA, India, and Spain. The most frequently used keywords in their publications are employees' pro-environmental behaviors, corporate social responsibility, environmental performance, green human resource management, environmental sustainability, green self-efficacy, and environmental passion. The graph shows that Pakistani and Chinese authors have extensively researched these keywords, particularly employees' pro-environmental behaviors, corporate social responsibility, green human resource management, and environmental performance. This suggests that these two countries lead the field's current knowledge base.

Additionally, the keywords show that both organizational practices and employees' psychological mechanisms promote pro-environmental behaviors. These keywords show the

least thematic diversity. This suggests that further keywords, themes, and perspectives remain underexplored.

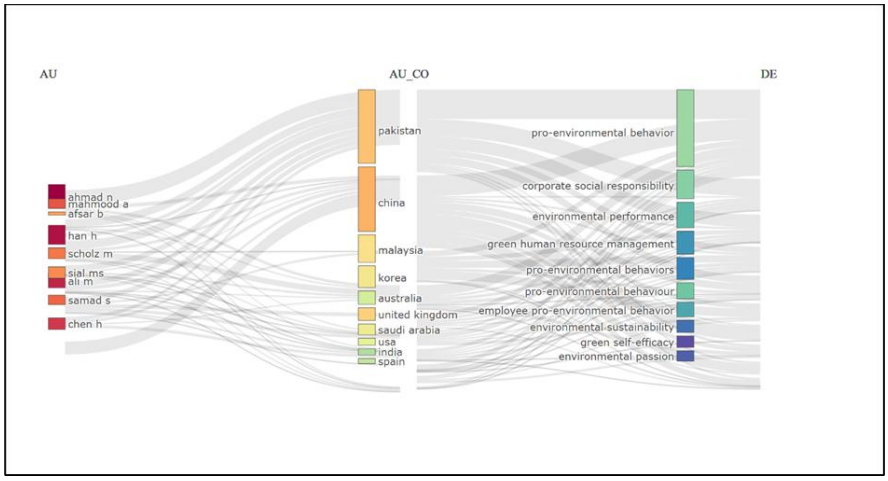


Figure 4. *Three Field Plots*

Note: Created by the authors using Biblioshiny, R Studio

Most relevant Sources

Figure 5 visualizes the prominent journals in this field. Sustainability (Switzerland), with 14 publications, is a leading journal. In second place, three journals have eight publications each: Corporate Social Responsibility and Environmental Management, Frontiers in Psychology, and International Journal of Environmental Research and Public Health. The Journal of Cleaner Production ranks third with six publications. The fourth position is held by the International Journal of Hospitality Management. These are also the prominent sources, according to Bradford Law (see Figure 6). The prominence of these journals suggests an interdisciplinary field that integrates psychology, environmental sustainability, and organizational behavior. It can be concluded that these journals are the principal sources for accessing articles and may also serve as outlets for future researchers.

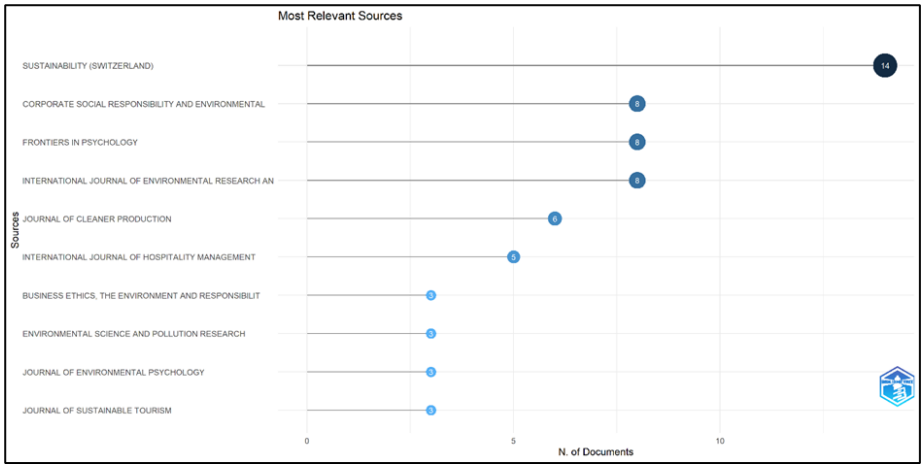


Figure 5. *Most Relevant Sources*

Note: Created by the authors using Biblioshiny, R Studio

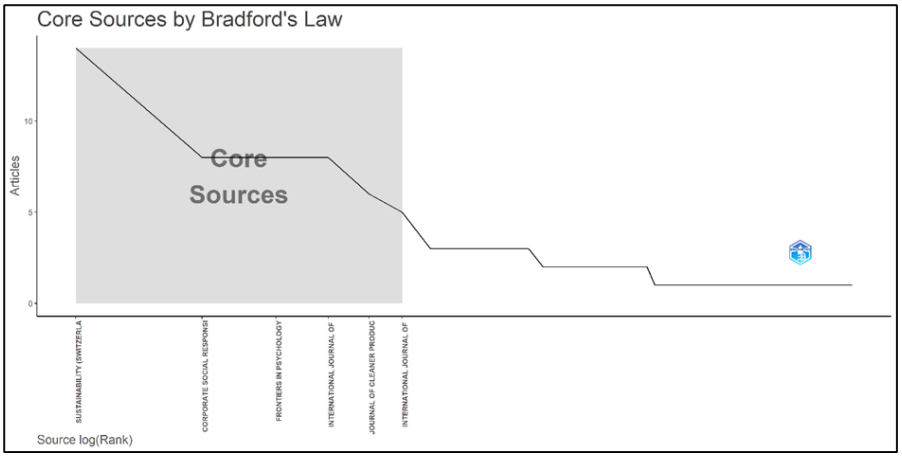


***Figure 6**. Core Sources by Bradford Law*

Note: Created by the authors using Biblioshiny, R Studio

Sources Local Impact

This refers to the journals' internal impact within the same database (Scopus). The most prominent Journal with the highest internal impact is Sustainability (Switzerland), with an H-index of 12. This consistency across multiple bibliometric performance indicators demonstrates that this Journal is not only the most productive but also the strongest in advancing the field's intellectual development in the Scopus database. Similarly, the other prominent journals include the International Journal of Environmental Research and Public Health (H-index of 8), Corporate Social Responsibility and Environmental Management, Frontiers in Psychology, and Journal of Cleaner Production, each with an H-index of 6 (Figure 7). This indicates that publishing in these journals will increase visibility.

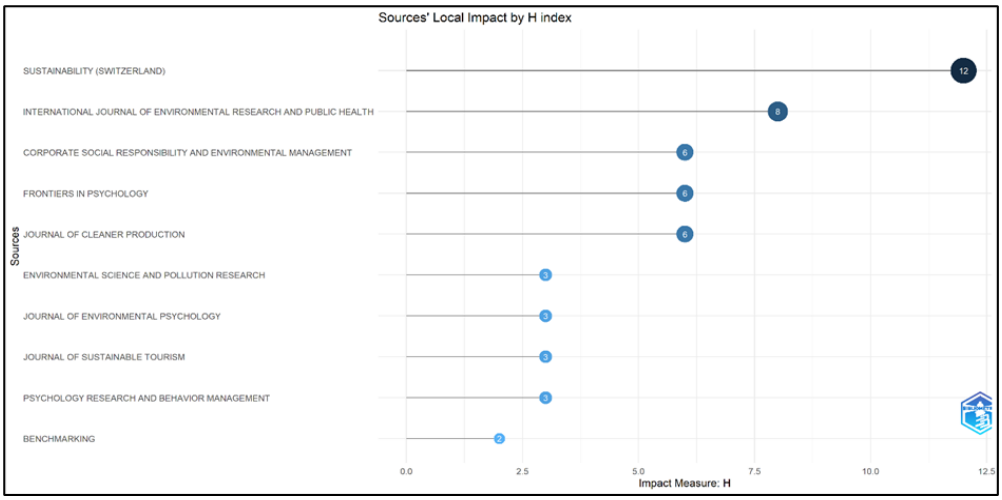


***Figure 7**. Source: Local Impact by H-index*

Note: Authors' creation using Biblioshiny, R Studio

Sources Production Over Time

Figure 8 shows the publication patterns of the leading journals over time. The prominent journals began publication in 2018 or later. Corporate Social Responsibility and Environmental Management began in 2018 with one publication that year and grew to 8 papers by 2025.

Frontiers in Psychology published its first paper in 2020 and grew each year until 2025, when it published 8 papers. The International Journal of Environmental Research and Public Health started publication in 2021. It published five papers that year, bringing the total to eight by 2025. The Journal of Cleaner Production began in 2019 with one publication and reached six papers by 2025. Sustainability (Switzerland) published its first paper on the same topic in 2019 and reached 14 by 2025. This aligns with the notion, cited in the Introduction, that previous studies have highlighted the global emphasis on environmental sustainability through individual and organizational practices. Given the gradual increase in publications and the involvement of multiple disciplines, it can be inferred that this concept has evolved from an emerging topic to an interesting and relevant research area. Further, considering the recent climate crisis, it remains an important research area.

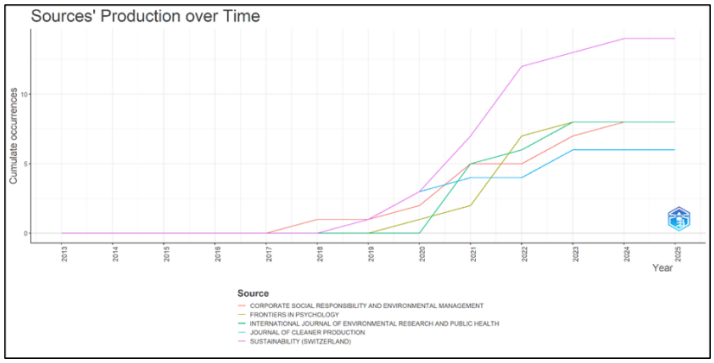


Figure 8. *Sources Production over Time*

Note: Authors' creation using Biblioshiny, R Studio

Most Relevant Authors

The figure below identifies the most prolific authors based on the number of publications on EPEB. Ahmad N., Han H., and Ali M. are prominent authors in this area, with 9, 7, and 6 publications, respectively. Other prominent authors with at least 4 publications include Chen H., Fatoki O., Mahmood A., Samad S., Scholz M., and Sial M.S. This concentration of publications among these authors shows that a small number of authors have advanced this field.

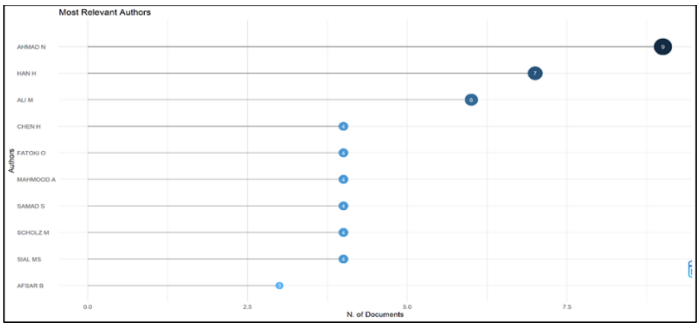


Figure 9. *Most Relevant Authors*

Note: Authors created using Biblioshiny, R Studio

Author's Local Impact

This measures authors' H-indices for their publications in the Scopus database. The two prominent authors by H-index are Ahmad N. (9) and Han H. (5) (Figure 10). Ali M., Chen H., Fatoki O., Mahmood A., Scholz M., and Sial M.S., with an H-index of 4, and Afsar B. and Al-Ghazali B.M., each with an H-index of 3, are the top ten authors with the highest local impact. The relatively high H-index indicates that these authors have substantial publication outputs and a frequent citation impact in the literature.

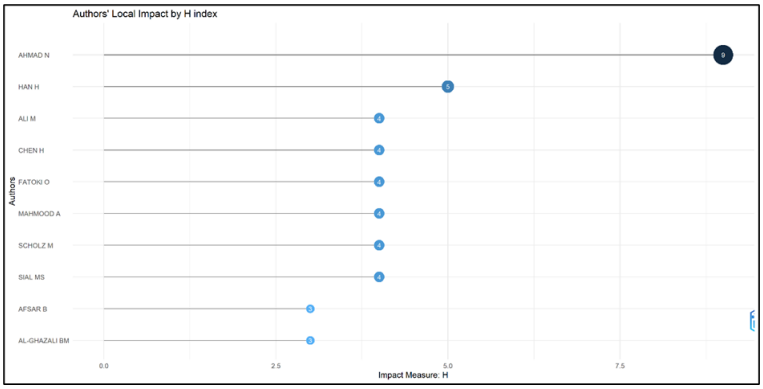


***Figure 10**. Authors Local Impact*

Note: Authors' creation using Biblioshiny, R Studio

Most Relevant Affiliations

Prominent affiliations indicate the institutions that contributed significantly to the development of this area. The Chinese University of Mining and Technology ranks first, with 20 publications. This dominance suggests the university's commitment to and interest in research on employees' pro-environmental behavior. The second prominent affiliation is the University of Central Punjab, with nine publications. The Queensland University of Technology and Sejong University rank third and fourth, with 7 publications each. The other six affiliations, each with six publications, are prominent institutions in this area (Figure 11). This disparity across institutions and geographic areas demonstrates the concentration of this topic within institutions across different countries.

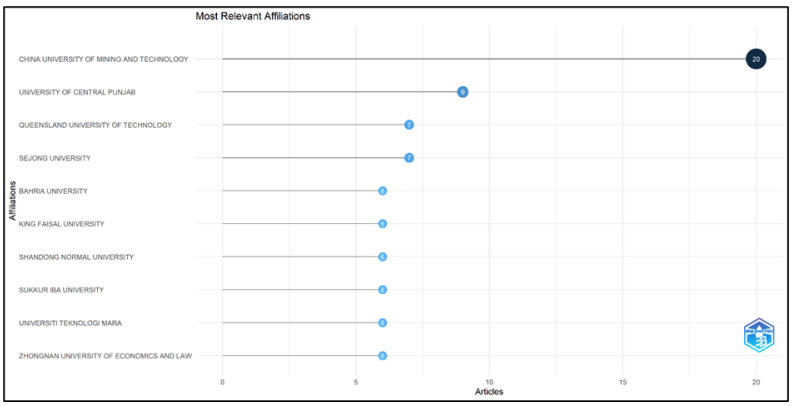


***Figure 11**. Most Relevant Affiliations*

Note: Authors' creation using Biblioshiny, R Studio

Corresponding Authors' Countries

Figure 12 shows not only a country's productivity but also its international collaboration. China leads with 44 publications with Chinese corresponding authors. Corresponding authors contributed to 17 multiple-country publications (MCP) and 27 single-country publications (SCP). These high MCP and SCP indicate strong domestic research capacity and international collaboration in Chinese institutions. The second country with the most corresponding authors is Pakistan, with 7 MCPs, 6 SCPs, and 13 publications in total. Because Pakistan's MCP exceeds its SCP, this underscores the importance of research collaboration in the country's research output. Other countries are Korea, the United Kingdom, Malaysia, Poland, Australia, Hong Kong, India, and South Africa. This domestic research capacity and international collaboration enhance knowledge exchange and the quantitative and qualitative development of this research area.

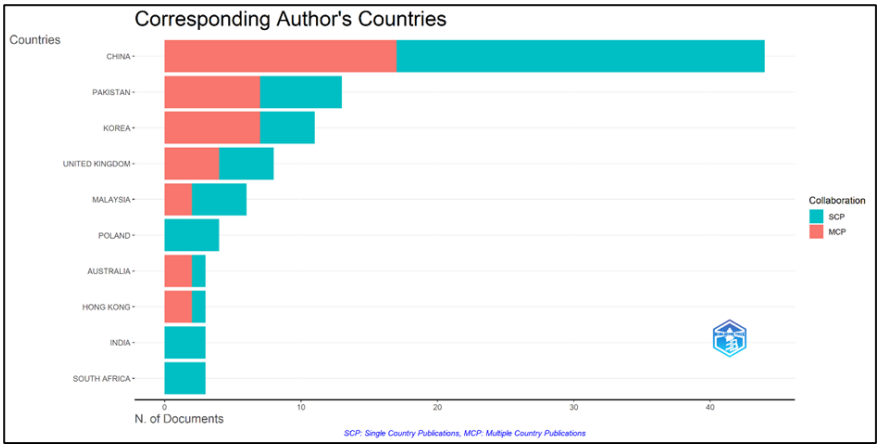


Figure 12. *Corresponding Authors Countries*

Note: Authors' creation using Biblioshiny, R Studio

Most Global and Local Cited Documents

Figures 13 and 14 show the most-cited documents globally and locally, based on the Scopus database and the retrieved EPEB dataset. The most-cited article, both locally and globally, is Robertson & Barling (2013), published in the Journal of Organizational Behavior, with 711 global citations and 70 local citations. This dominance indicates that this article is relevant not only to Scopus-indexed journals but also to the EPEB dataset retrieved for analysis. The second and third most globally cited documents are (Afsar et al., 2016), Journal of Environmental Psychology, with 355 citations, and (Zientara & Zamojska, 2018), Journal of Sustainable Tourism, with 239 citations. In the second and third positions among highly locally cited documents are (Afsar et al., 2016) in the Journal of Environmental Psychology (34 citations) and (Afsar & Umrani, 2020) in the Journal of Corporate Social Responsibility and Environmental Management (28 citations).

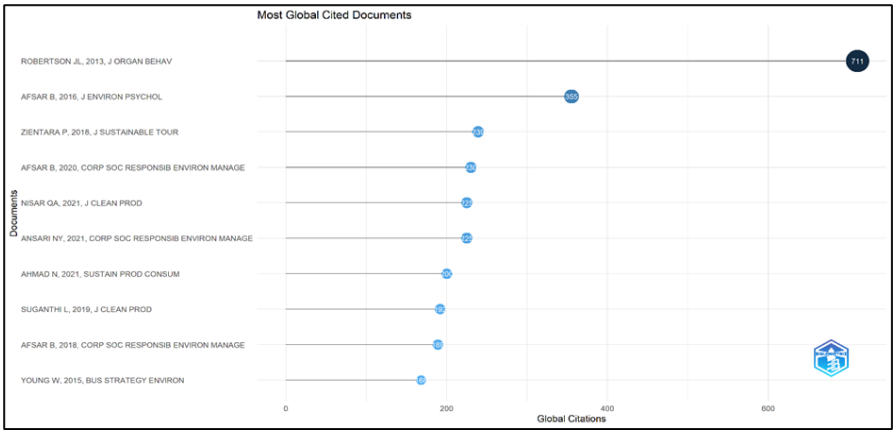


***Figure 13**. Most Global Cited Documents*

Note: Created by the authors using Biblioshiny, R Studio

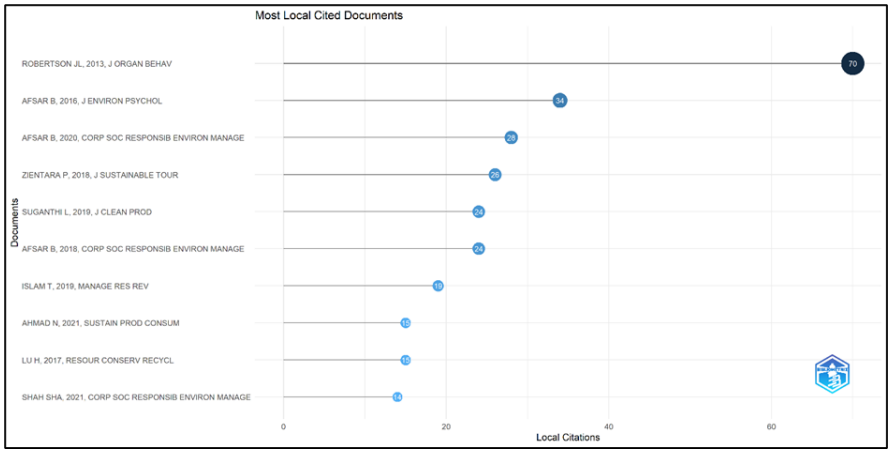


***Figure 14**. Most Local Cited Documents*

Note: Created by the authors using Biblioshiny, R Studio

Most Relevant and Frequent Words

Figure 15 presents the most frequently used keywords in authors' publications. This analysis highlights the highly concentrated themes and concepts researchers focus on. Words such as pro-environmental behavior (44), corporate social responsibility (14), pro-environmental behavior (13), environmental performance (12), employee pro-environmental behavior (11), green human resource management (11), pro-environmental behaviors (10), environmental sustainability (8), environmental passion (6), and green self-efficacy (6) are the most frequently studied concepts by authors. The prominence of pro-environmental behavior across settings confirms that researchers have focused on this concept. It also confirms our notion regarding the inclusion of articles: we included studies that used the term pro-environmental behavior' in their title, abstract, or keywords.

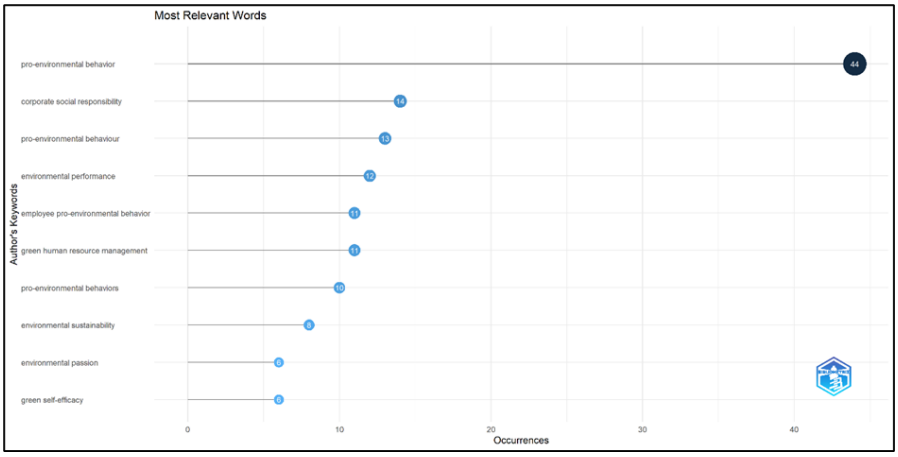


***Figure 15**. Most Relevant Words*

Note: Created by the authors using Biblioshiny, R Studio

Trending Topics

The analysis illustrates the evolution of research trends over the past 6 years (2018-2024). Figure 16 shows that trending topics in understanding EPEB include organizational-level factors such as green human resource management, corporate social responsibility, and organizational identification. Additionally, individual-level factors have also trended in recent years, including green self-efficacy and environmental commitment. In recent years (2022 & 2024), EPEB's relationship with overall organizational sustainability outcomes has also become a trending topic, including achieving environmental sustainability and enhancing organizational environmental performance. The analysis reveals that, although organizational and individual psychological factors remain important predictors of EPEB, researchers' interest is shifting toward EPEB outcomes (D. Yang et al., 2025), such as environmental sustainability, commitment, and performance.

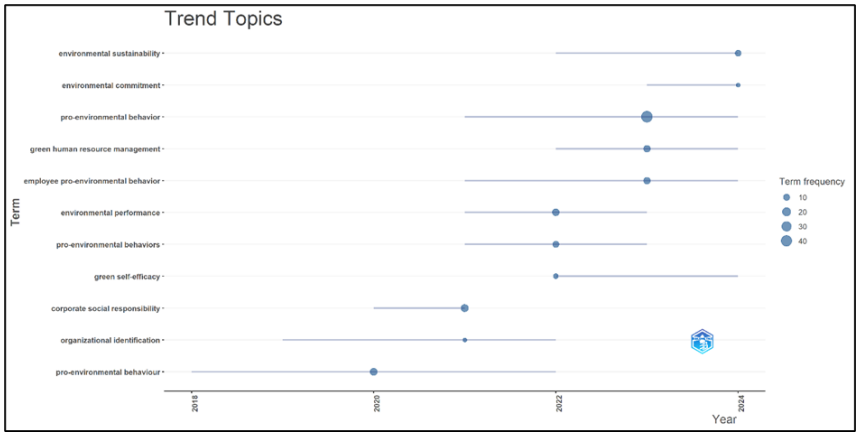


***Figure 16**. Trending Topics*

Note: Authors' creation using Biblioshiny, R Studio

Field's Conceptual Structure

Co-occurrence Network

Figure 17 presents the co-occurrence of the authors' keywords in the literature, illustrating the conceptual structure of EPEB. These 443 keywords form six clusters, representing six major research streams pursued by researchers. These clusters also show how the topic has evolved from studying the antecedents of EPEB to its positive outcomes on organizational sustainability and environmental performance. Through co-occurrence analysis, keywords are classified into six groups: 1st cluster (red), 15 keywords; 2nd cluster (Blue), 4 keywords; 3rd cluster (green), 3 keywords; 4th cluster (purple), 6 keywords; 5th cluster (orange), 4 keywords; and 6th cluster (brown), 2 keywords.

Cluster 1: Pro-environmental behavior, individual and organizational factors;

Cluster 2: Corporate social responsibility, environmental commitment, green practices, and organizational altruistic values;

Cluster 3: Pro-environmental behaviors of employees in hotels;

Cluster 4: green management practices and organizational performance;

Cluster 5: Ethical leadership, CSR, and sustainability; and

Cluster 6: Green self-efficacy and environmentally specific servant leadership.

Cluster 1 (Red). This largest and most central cluster contains 15 keywords, with a betweenness of 408.866. This cluster's dominant position suggests it as the core knowledge base for EPEB research. The individual factors studied with EPEB include environmental concern, environmental passion, motivation, green commitment, and spirituality. In contrast, organizational factors studied with EPEB include green psychological climate, green leadership, environmental awareness, extra-role behavior, and autonomy. This integration of individual- and organizational-level factors suggests that EPEB results from the interaction between individual psychological factors and workplace resources. These factors are primarily studied in relation to environmental sustainability, mainly in the hotel industry. The prominence of EPEB research in the hotel industry suggests that hospitality is a primary empirical context in developing EPEB theories.

Cluster 2 (Blue). This cluster comprises four keywords. This cluster includes keywords related to organizations' responsibilities to society. These include corporate social responsibility (CSR), environmental commitment, green practices, and organizational altruistic values. This cluster shows that researchers considered EPEB beyond individual behaviors, focusing on organizational values and ethical responsibilities. The close association among the keywords in this cluster indicates that organizations use corporate social responsibility to internalize environmental values, thereby promoting green work engagement and pro-environmental behaviors. Given this cluster's small size, future researchers can investigate the role of other variables in understanding the underlying

mechanisms (mediation and moderation) between CSR, organizational values and commitments, and green practices.

Cluster 3 (green). This cluster consists of three keywords. This cluster indicates that most studies have focused on employees' pro-environmental behaviors in the hotel and tourism industry. This underscores the importance of EPEB in influencing resource conservation and sustainable service delivery in this sector. Additionally, this dominance also indicates an imbalance in the literature; findings from other sectors remain limited. Regarding this, it is recommended that future researchers retest the findings from this sector in other sectors to check the generalizability of the current findings.

Cluster 4 (purple). This cluster comprises six keywords. This cluster shows that studies examine the impact of green organizational practices, including green human resource management, organizational identification, green transformational leadership, and employees' pro-environmental behaviors, on environmental and economic performance. The keyword cluster indicates that organizations view green practices and EPEB as strategies to achieve competitive advantage through environmental sustainability. This cluster also suggests that organizations view pro-environmental behaviors not only as voluntary actions but also as organizational resources, sustainability initiatives, and long-term organizational outcomes.

Cluster 5 (orange). Cluster 5 was formed from four keywords. This cluster links corporate social responsibility, ethical leadership, and organizational sustainability within small and medium-sized enterprises (SMEs). This link indicates that the literature has examined ethical leadership and corporate social responsibility as organizational-level factors and job resources that influence EPEB and contribute to organizational sustainability, especially in SMEs. Although EPEB has been studied in large organizations, this cluster suggests that researchers are also investigating it in small and medium-sized enterprises. It can be concluded that leadership and corporate social responsibility in facilitating EPEB and achieving organizational sustainability in resource-constrained organizations (SMEs) are also increasingly being studied.

Cluster 6 (brown). This cluster is an extremely specialized research stream, with only two keywords: green self-efficacy and environmentally specific servant leadership. This low betweenness centrality indicates that this is an emerging topic. This cluster underscores the importance of environmentally specific servant leadership in fostering employees' green self-efficacy. This green self-efficacy can be regarded as a form of psychological empowerment. This notion offers an important theoretical insight and aligns with social learning theory, which posits that individuals learn from the behaviors and attitudes of others (leaders) within the same society. It also aligns with JDR theory, which posits that job resources, specifically environmentally specific servant leadership, influence personal resources, such as self-efficacy, leading to pro-environmental behaviors.

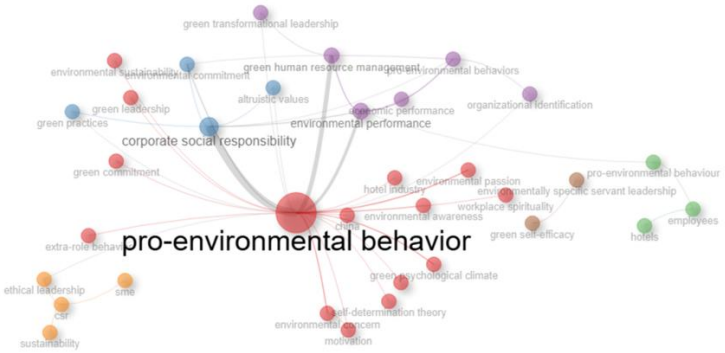


***Figure 17**. Co-occurrence Network*

Note: Created by the authors using Biblioshiny, R Studio

Thematic Map

The thematic map classifies the research field into four themes: Basic Themes, Motor Themes, Niche Themes, and Emerging or Declining Themes. These themes are based on density (degree of development) on the Y-axis and centrality (relevance in the field) on the X-axis. Through analysis, 19 thematic clusters are identified, illustrating the maturity, interconnectedness, and future research direction in the EPEB field.

Motor themes show high centrality and density, indicating they are important and well developed. Niche themes are well developed but have low centrality because they are specialized research areas.

Motor Themes are formed from pro-environmental behavior, pro-environmental behaviors, and environmental concern. Their high centrality and density indicate that they are important and well developed. These concepts form the intellectual core of this research field. Given the prominence of these themes, we could conclude that previous research has focused on understanding general pro-environmental behaviors and the psychological factors behind them, such as environmental concern. The well-developed nature of these themes provides a strong theoretical and empirical foundation and makes them central references for ongoing research.

Niche themes, including environmental-specific servant leadership, green, and human resource management, are highly dense and remain under investigation for their relevance. These concepts are developed in specialized research areas but remain isolated from the literature. This isolation suggests opportunities to examine relationships among environment-specific servant leadership, human resource management, and EPEB.

In the Basic themes quadrant, the identified clusters are environmental management, organizational identity, employee pro-environmental behavior, leader-member exchange, corporate social responsibility (CSR), and green commitment. Analysis reveals that these themes are highly relevant in the field, but their low density suggests they are still evolving

empirically and conceptually. EPEB's placement in this quadrant suggests it is an important, central topic in organizational sustainability research. Despite this, its theoretical development remains incomplete, as previous studies mostly focused on EPEB antecedents. Additionally, the underlying mechanisms, such as mediation and moderation, cross-cultural contexts, longitudinal designs, and multilevel influences, remain underexplored.

Emerging or Declining Themes, including green training, green human resource management, and organizational performance, are identified. These themes show low density and centrality, indicating they are underdeveloped and have received limited attention in this field. Given the recent growth of green human resource management, these themes are not declining; rather, they are emerging areas that still attract insufficient research attention. Additionally, these findings show that researchers' attention is shifting from individual green behaviors to the role of organizational policies and practices in shaping EPEB and its outcomes.

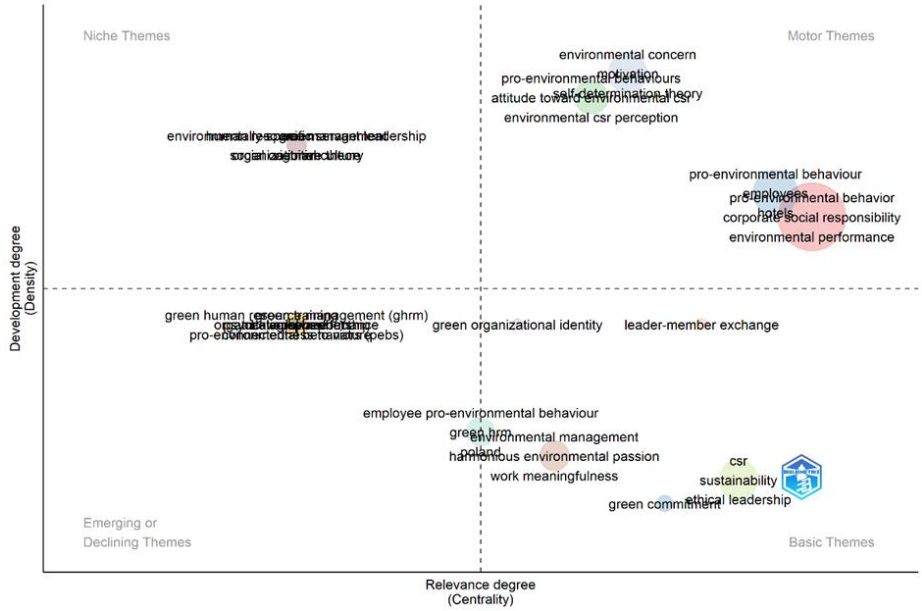


Figure 18*. Thematic Map Analysis*

Note: Authors' creation using Biblioshiny, R Studio

Field's Intellectual Structure

Co-citation Network

Using the co-citation network, we identify the field's intellectual structure by examining documents cited together. This analysis helps readers identify the articles that form the field's theoretical and conceptual foundation. The analysis identified 7 major clusters. It shows how EPEB is connected with 7 distinct knowledge domains.

In the first cluster, Dumont et al. (2017), with a betweenness of 300.301, is a highly co-cited document alongside the other nineteen papers shown in Figure 19. This prominence indicates that this paper, rather than connecting a single stream, integrates multiple research

streams with EPEB. This paper appears to link organizational practices and individual psychological factors, such as employee motivation, to EPEB.

The second cluster comprises documents by Blau (1964) and Mael & Ashforth (1992), with a betweenness of 96.228. This prominence indicates that the authors drew on established organizational behavior and social science theories, including social exchange theory and organizational identity theory, to understand EPEB. This suggests the topic's interdisciplinary nature.

The third cluster includes Tian & Robertson (2019), Bissing-Olson et al. (2013), and Robertson & Barling (2013). This cluster is formed from influential empirical works done on EPEB, specifically in organizational settings. This strong co-citation network among these papers shapes the current understanding of antecedents, mediators, moderators, and the EPEB outcome in organizational settings.

The fourth cluster includes Afsar et al. (2016), with a betweenness of 264.352. It is the most co-cited paper in the cluster. Its prominence stems from its integration and examination of relationships between organizational- and individual-level factors. These organizational-level factors include leadership, and the individual-level factors include motivation, spirituality, and environmental passion, all of which influence EPEB.

The clusters of five, six, and seven, each comprising documents by Aiken (1991), Bandura (1977), and Brislin (1986), are other prominent papers co-cited by other papers. Although these articles do not directly investigate the EPEB, their co-citation indicates a foundational contribution to the field. The presence of papers in the co-citation network that do not directly examine EPEB demonstrates that the research in this area has adopted established theories and rigorous methodologies from other disciplines.

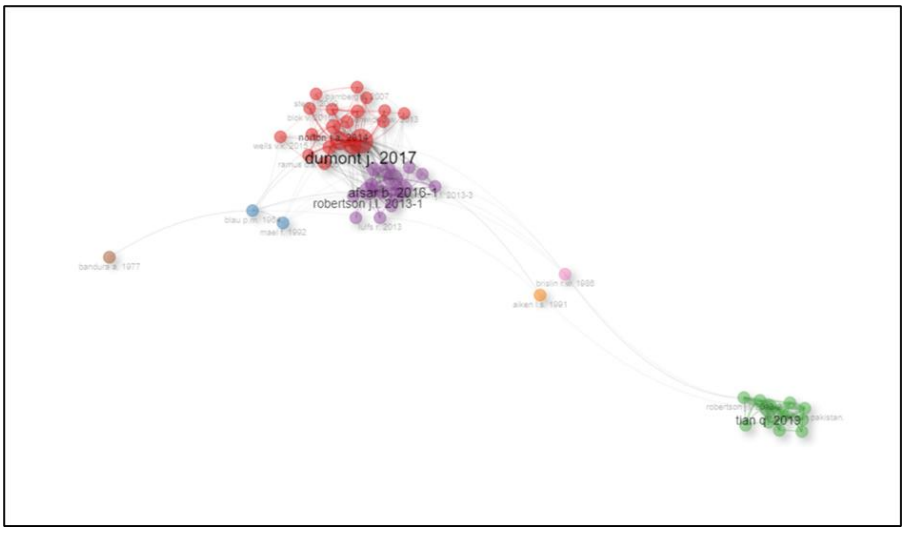


***Figure 19**. Co-citation Network*

Note: Authors' creation using Biblioshiny, R Studio

Historiography

Figure 20 illustrates how this concept has evolved intellectually over time by tracing the citation relationships among the articles. This network indicates that the field is traced back to the first paper by Robertson & Barling (2013), titled “Greening Organizations Through Leaders' Influence on Employees' Pro-Environmental Behaviors.” This foundational paper is highly cited in subsequent documents. This analysis reveals that early research in this area focused on leadership as an organizational mechanism for understanding EPEB.

Subsequent research, including Afsar et al. (2016, 2018); Afsar & Umrani (2020); Ahmad et al. (2021); Gkorezis & Petridou (2017); Lu et al. (2017); and Zientara & Zamojska (2018), further develops this topic. Their research agenda has expanded beyond examining leadership's influence on EPEB to include other organizational and psychological factors. The concentration of citations around these articles, as shown in the graph, suggests that a few studies played a crucial role in the field's intellectual development. This figure also suggests that the field is not drawing on a diverse intellectual base. In this case, this topic remains a developing research domain.

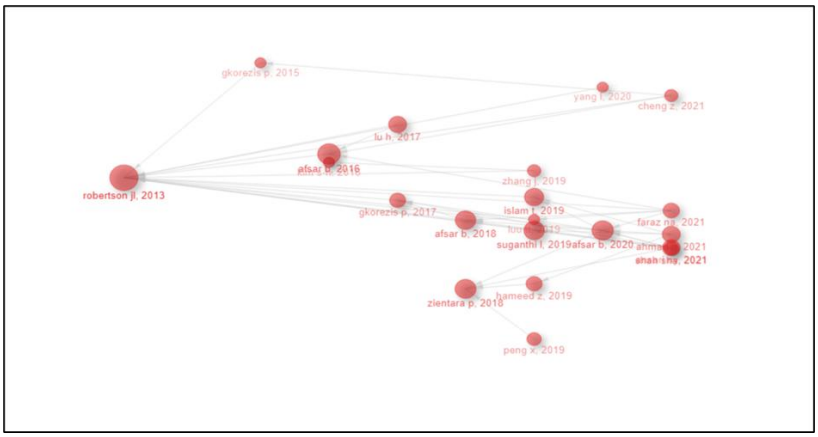


***Figure 20**. Historiography Analysis*

Note: Authors' creation using Biblioshiny, R Studio

Fields’ Social Structure

Authors and Countries Collaboration Network

The analysis is performed using the field author and at least one collaboration link (edge). The most prominent authors, with the highest number of collaborations, are Ahmad N., Li Z., and Chen H. (Figure 21). Their large nodes indicate that they are connected to other researchers and engage in collaborative research on EPEB. The presence of other clusters suggests that scholarly work on EPEB is conducted not only by independent researchers but also through interconnected collaborations.

Figure 22 visualizes the countries with the highest collaborations. China and Pakistan, with 12 collaborations, are the most-collaborating countries in this field. Other collaborating countries are Pakistan and Saudi Arabia, with 9 collaborations; Pakistan and Korea, 7, China and Korea, 5, China and Saudi Arabia, 5, Pakistan and Malaysia, 5, China and Hong Kong, 4,

China and the United Kingdom, 4, China and Australia, 4; and Pakistan and the United Kingdom, 4. The close ties between China and Pakistan suggest that these two countries are important international hubs for EPEB research. Additionally, the analysis shows that collaboration is expanding from neighboring countries to partnerships across continents. This indicates that interest in EPEB research is not limited to a single country or continent but rather constitutes a global research concept.

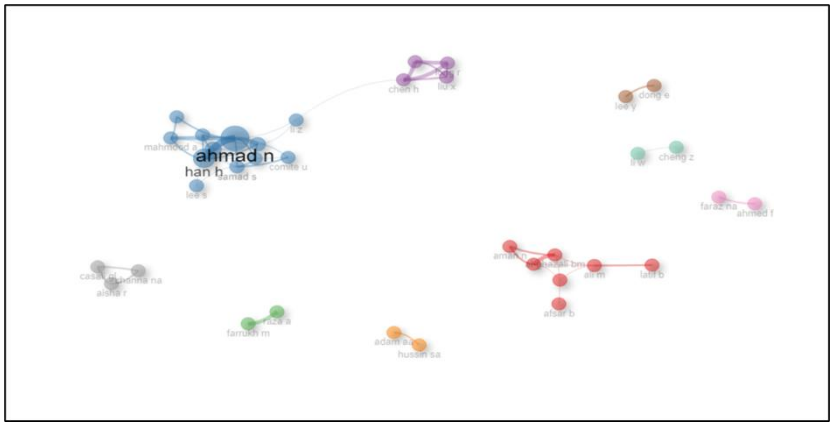


Figure 21. *Authors Collaborations*

Note: Authors' creation using Biblioshiny, R Studio

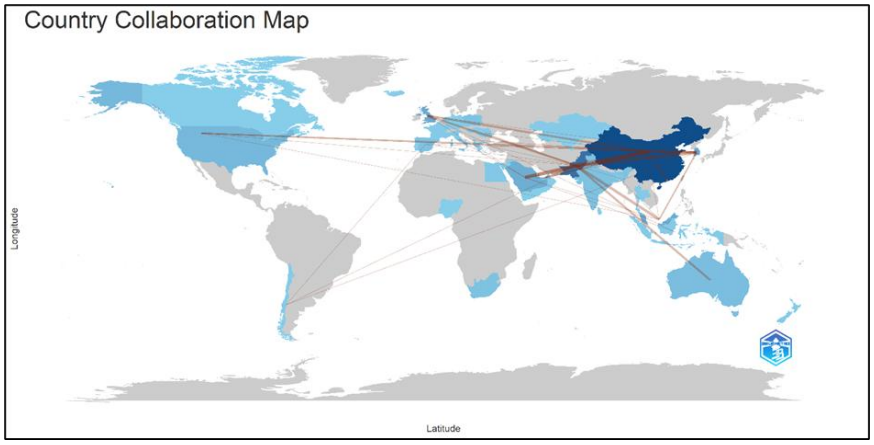


Figure 22. *Countries Collaborations*

Note: Authors' creation using Biblioshiny, R Studio

DISCUSSION

Employees' pro-environmental behaviors significantly impact environmental sustainability. To achieve environmental sustainability, interest in this research area continues to grow (Kim et al., 2024; Lee et al., 2024; Zheng et al., 2025). The growing importance and gradual increase in research on this topic among researchers in recent years are confirmed by the annual scientific production analysis. Additionally, analysis of globally and locally cited documents indicates that research focuses on understanding the influence of organizational policies and practices, as well as individuals' psychological mechanisms. This notion is also supported by Mateen et al. (2023a), who noted that prior literature has focused on organizational- and

individual-level antecedents influencing EPEB. This suggests that other factors remain understudied and that EPEB outcomes are less well investigated; researchers have highlighted its importance (Yang et al., 2025). Consistent with this, the first cluster of the co-occurrence network indicates that the relationship between individual- and organizational-level factors and EPEB has been widely studied. Given the nature of the sixth cluster in the co-occurrence network, it is reasonable to argue that future research can integrate diverse leadership styles, psychological factors (e.g., self-efficacy), and new organizational contexts into a unified theoretical model. This perspective will provide comprehensive explanations of how and which job resources, such as leadership styles, influence individuals' cognition and, in turn, enhance their pro-environmental behaviors.

From an intellectual perspective, EPEB borrowed established theories and methodologies from other disciplines. While its interdisciplinary nature is a strength, it could expand its intellectual base by integrating additional theories, examining new variables and methodologies, and conducting studies in different contexts. The theories adopted from different subject areas, including Social Identity theory (Tajfel, 1985), Social Exchange Theory (Blau, 1964; Cropanzano & Mitchell, 2005), Self-determination Theory (Deci & Ryan, 2008), Social Cognitive Theory (Bandura, 1988), Theory of Planned Behaviour (Ajzen, 1991), Ability-Motivation-Opportunity Theory (AMO) (Appelbaum, 2000), Values-Beliefs-Norms Theory (Stern et al., 1999)are used to study how and why factors influence EPEB. In conclusion, EPEB is not solely an individual choice behavior but is shaped by both the organizational environment and individual psychological characteristics.

Relevant theories from organizational behavior, human resource management, psychology, and sociology are applied to understand EPEB. Future researchers may draw on other theories from other subject areas to enrich the theoretical and conceptual understanding of this area. For example, in behavioral economics, Prospect theory (Kahneman & Tversky, 2013) examines how perceived gains and losses influence employees' behaviors. This theory explains that individuals feel losses more strongly than gains; accordingly, they make decisions to reduce their losses. This theory can be used to examine whether increasing awareness and knowledge of the losses people may face from the escalating environmental crisis, relative to the perceived short-term gains of maintaining current behaviors, influences their pro-environmental behavior. The second category is institutional and public policy theories. Theories from these subject areas include institutional theory (Meyer & Rowan, 1977), legitimacy theory (Suchman & Mark, 1995), and regulatory compliance theory (Ayres & Braithwaite, 1997). These theories focus on how rules, regulations, norms, and institutional and industry pressures shape behavior. These theories posit that individuals usually adjust their attitudes and behaviors in response to these factors. Beyond organizational and individual-level factors, examining the role of rules, regulations, norms, and government policies will expand the EPEB. Din et al. (2025) also identify government policies and public awareness as areas for future research.

The third category of theories concerns technology and information systems. Given technological advancements in organizations, future studies examining the influence of technology on employees' pro-environmental behaviors should adopt the technology acceptance model (TAM) (Davis, 1989) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003). To identify whether employees consider technologies and AI as job demands or job resources. Job Demand-Resource theory (JDR) proposes that job resources motivate employees to enhance their work engagement, leading to positive outcomes. In contrast, job demands increase burnout and lead to negative outcomes in an organization (Bakker & Demerouti, 2017). Studying the role of technology in EPEB aligns with the future research direction proposed by Farrukh et al. (2025).

As the analysis shows, most studies are conducted in developing Asian countries, such as China and Pakistan. This concentration reflects the need to address growing environmental challenges in densely populated South Asian countries, including China, Pakistan, and India (Din et al., 2025). Future researchers may target populations in other developed and underdeveloped countries across continents such as Europe, the Americas, and Africa. Most studies are conducted in private-sector organizations; within the thematic map, the hospitality sector is the dominant context. Future researchers may study the EPEB concept in public and government-sector organizations, as these sectors are cited as under-researched in the literature (Yang et al., 2025).

Additionally, future researchers may use these theories to develop new constructs and examine their impact on EPEB. Another highly emphasized future research direction is to conduct qualitative (Din et al., 2025), longitudinal (Farrukh et al., 2025), and experimental studies (Zheng et al., 2025) to establish causal effects, as previous studies have mostly been cross-sectional. For data collection, although questionnaires are suitable, future researchers could also use observations (Farrukh et al., 2025), interviews, and focus group discussions to gain deeper insights. Lastly, because various antecedents have been found to positively and significantly influence EPEB (Mateen et al., 2023), Future researchers may shift their focus to studying EPEB as a mediating variable to identify its influence on organizational outcomes. The important organizational outcomes to be covered are innovation, competitive advantage, profitability, environmental performance, and organizational sustainability.

CONCLUSION

This study provides a comprehensive review of the Scopus-indexed literature on EPEB, examining publication patterns and the field's conceptual, intellectual, and social structures. Thematic analysis indicates that EPEB is an underdeveloped, yet increasingly important and relevant research area. The science mapping reveals that this topic focuses on employees' psychological mechanisms and on organizational policies and practices that facilitate employees’ pro-environmental behaviors. Comparatively, less attention is given to outcomes and their underlying mechanisms. Given this limited conceptual development and the reported positive effects of this concept on environmental sustainability, performance, green

innovation, profitability, and productivity (Cheng et al., 2022; Elshaer et al., 2023; Farrukh et al., 2025; Hongxin et al., 2022; Perano et al., 2024), there is considerable scope for future research. Drawing on the TCCM framework (Paul & Rosado-Serrano, 2019), this study identifies opportunities across theory, context, characteristics, and methodology. Theoretically, this study contributes to consolidating existing theories adopted in prior studies and to identifying possible underexplored theories for studying the antecedents, mechanisms, and outcomes of EPEB. From a bibliometric review perspective, this study integrates performance analysis and science mapping and uses the TCCM framework to understand the evolution, knowledge, and research gaps in the EPEB literature. Overall, this review goes beyond mapping the literature by synthesizing the current state of EPEB research; it provides a foundation for further development by considering the relevance of human and organizational roles in addressing environmental challenges (Bentler et al., 2023).

Implications

To state the practical implications of this study, it is necessary to cite Mansour et al. (2022), who noted the main question raised recently regarding climate change and global warming: how to make it easier for employees to behave in environmentally friendly ways, and which factors influence this behavior? Bibliometric analysis indicates that green human resource management, corporate social responsibility, and leadership are predominant organizational-level themes associated with EPEB. Additionally, individual or psychological factors, including motivation, self-efficacy, environmental concern, attitudes, subjective norms, and perceived behavioral control, are another category of themes associated with EPEB. Considering the existing literature indicates that EPEB leads to organizational environmental performance, sustainability, competitive advantage and profitability, we recommend that the focus of organizational managers should shift toward green human resource management (Mateen et al., 2023a), investing in CSR (Min et al., 2024), and green leadership (Ansari & Khan, 2024; Ren et al., 2024), while enhancing employees' awareness (Omarova & Jo, 2022), motivation (Sharpe et al., 2022), concern (Zhang & Huang, 2019), self-efficacy (Yuan & Li, 2023), and attitudes (Sabbir & Taufique, 2022) to guide and enhance employees’ intentions and behaviors. This will integrate EPEB into the organization's overall strategy and, specifically, its sustainability strategies.

By viewing green human resource management as a strategic instrument to support organizational sustainability (Din et al., 2025a), managers can adjust HR policies to encourage EPEB. Managers may focus on assessing environmental concern, attitude, self-efficacy, and other psychological factors positively associated with EPEB during employee recruitment and selection. Also, green training and awareness programs may be conducted for current and new employees. Lastly, organizations may integrate environmental objectives into employees’ performance management and incentivize employees who meet them.

Overall, the findings provide organizational managers with evidence-based insights to inform decision-making, enabling them to design employee-focused environmental initiatives

and implement green HRM practices. Applying these findings will help organizations improve environmental performance and achieve sustainability goals.

Study Limitations

Although using the Scopus database has advantages, relying on a single database has limitations. First, despite its broad coverage, other databases, including Web of Science, Dimensions, PubMed, and Google Scholar, may index relevant publications that are overlooked. Second, the findings may be subject to database selection bias; therefore, the findings should be interpreted within the scope of this database. In this regard, future researchers interested in conducting bibliometric analysis on EPEB are encouraged to use multiple databases to conduct a comprehensive review.

Despite the advantages of bibliometric analysis reviews mentioned in the Methodology section, such reviews have limitations, including limited insight into theoretical reasoning and reporting of individual studies' findings. These bibliometric reviews do not provide a detailed, critical assessment or report the studies' empirical evidence; they only map the development and structure of the EPEB literature. Accordingly, interpretations should be made cautiously. To address these limitations, we recommend that future researchers use hybrid review approaches by complementing bibliometric analyses with systematic/content-based reviews or meta-analyses.

Authors' Contribution

- Mohammad Fahim Karimi: conceptualization, methodology, data curation, formal analysis, visualization, writing original draft, review & editing.
- Dr. Madhu Lal M.: methodology, validation, review & editing, and supervision.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

Data Availability Statement

The data presented in this study are available upon request from the corresponding author.

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